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PATENT SPECIFICATION

(11) 1 315 304

NO DRAWINGS

(21) Application No. 31361/69 (22) Filed 20 June 1969
(23) Complete Specification filed 15 June 1970
(44) Complete Specification published 2 May 1973
(51) International Classification C10L 1/18
(52) Index at acceptance
C5G 1A1

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(54) FUEL OIL ADDITIVE

(71) We, COALITE AND CHEMICAL PRODUCTS LIMITED, a British Company, of Buttermilk Lane, Bolsover, near Chesterfield, Derbyshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement.—

The invention relates to a fuel oil additive.

Many fuel oils, particularly low grade residual fuel oils, contain compounds which upon combustion of the fuel oils produce an ash which corrodes or is otherwise detrimental to metal parts of the plant, for example a furnace or gas turbine, in which combustion of the fuel oils is effected. Vanadium compounds are common contaminants in such fuel oils and they produce a corrosive ash upon combustion of the fuel oils.

It is known to effect the combustion of such fuel oils in the presence of various solid compounds (hereinafter termed corrosion inhibitors) which are effective in mitigating the corrision produced by the ash. The corrosion inhibitor may be introduced directly into the combustion chamber, for example in an air supply line or through an independent line or it may be slurried with the fuel oil or it may be mixed with the fuel oil in the form of a concentrate in a portion of the fuel oil containing a dispersant for the corrosion inhibitor.

It is an object of the invention to provide, as a fuel oil additive, a composition which is readily prepared and which is effective to mitigate corrosion produced by corrosive ash formed upon the combustion of a fuel oil.

According to the invention there is provided a composition suitable for use as a fuel oil additive, the composition comprising (i) a tar acid fraction boiling in the range 180-320°C, particularly a tar acid fraction obtained from the low temperature carbonisation of coal, and (ii) a solid corrosion inhibitor (as hereinbefore defined).

The tar acid fraction enhances the effect of the solid corrosion inhibitor and/or itself has properties which inhibit the corrosive effect of the corrosive ash produced upon the combustion of a fuel oil.

As is known, the phrase " tar acids " is a term of art for phenols and the tar acid fraction boiling within the range 180-320°C is a fraction consisting substantially wholly of alkylphenols. The tar acid fraction employed may be and preferably is of narrower boiling range, but even so it will be understood that the tar acid fraction of narrower boiling range will also consist substantially wholly of alkylphenols.

A particularly preferred tar acid fraction has a boiling range of substantially 230-280°C. Another suitable tar acid fraction has a boiling range of substantially 240-318°C.

One suitable tar acid fraction (X.L.) derived from the products of the low temperature carbonisation of coal had a boiling range of 230°-280°C and was found to have the following composition:—

Alkylphenols	70%
Indanols	20%
Indenols	2%
Dihydric phenols	2%
Remainder (unidentified)	6%

The predominant alkylphenols were 3-methyl-5-ethylphenol. 2,3,5-trimethylphenol, 3,4,5-trimethylphenol and meta- and para-*n*-proylphenols. The main constituents of the indanol group were 4- and 5- indanol but several methylindanols were also identified.

The solid corrosion inhibitor in the composition or additive may be one or more of the many which are known, including in-

[*Price 25p*]

organic compounds of magnesium, alkaline earth metals, zinc and aluminium. The preferred solid corrosion inhibitor is magnesia.

The concentration of the solid corrosion inhibitor in the fuel oil additive may vary over a wide range. It is suitably present in an amount of up to 100% by wt., preferably from 10% to 55% by wt., for example 15-35% by wt., of the tar acid fraction.

In the production of the fuel oil additive, the solid corrosion inhibitor in finely divided form is dispersed in the tar acid fraction. This may, for example, be effected in a ball mill, a paint mill or similar apparatus.

A surfactant may be used in dispersing the finely divided, solid corrosion inhibitor in the tar acid fraction. The use of a surfactant is, in general, not necessary. However, should the use of a surfactant be found to be desirable or necessary, carboxylic acids of high molecular weight, particularly fatty acids containing 12-22 carbon atoms in the molecule, for example stearic acid oleic acid and the fatty acid or fatty acid composition commercially available under the trade name "Roleic acid" (Geigy Ltd), and silicones have been found to be suitable.

A preferred fuel oil additive comprises a dispersion of magnesia, as the solid corrosion inhibitor, in the X.L. tar acid fraction, the magnesia being present in an amount of about 50% weight over weight. Such additive is suitably added to a vanadium-containing fuel in an amount of 1.3 grams per gram of vanadium (calculated as the pentoxide) in the fuel oil.

The additive is also effective in mitigating the production of acid smuts upon the combustion of fuel oils.

The additive is suitably added to the fuel oil immediately before the fuel oil is burnt. One preferred method of doing this is to meter the additive, for example by means of an injection pump, into a line which feeds the fuel oil directly to one or more burners. Such metering position is preferably such that from it the fuel oil with the incorporated additive passes direct to the burner or burners without passing through a pump or storage tank or other quiescent zone. Another method consists in adding the additive to the fuel oil as the fuel oil is passing through the burner or as it enters the burner or as it leaves the burner.

The invention is illustrated in the following examples.

Example 1

Magnesium oxide having a particle size in the range 7-10 microns was stirred into a tar acid fraction having a boiling range of 230-280°C and the composition hereinbefore given for the X.L. tar acid fraction. The mixing was effected with a paddle-type agitator rotating at approximately 100 rpm. The temperature was ambient and sufficient magnesium oxide was stirred into the X.L. tar acid fraction in order to give a 50% weight over weight concentration of magnesium oxide.

Example 2

The procedure of Example 1 was repeated. The dispersion of magnesium oxide in the tar acid fraction was then passed though a colloid mill. This added step gave a suspension which was more stable than that obtained in Example 1.

Example 3

Example 1 was repeated but to give a fuel oil additive containing 20% w/w magnesium oxide.

Example 4

Example 2 was repeated but to give a fuel oil additive containing 30% w/w magnesium oxide.

Portions of the four additives produced in Examples 1 to 4 were added to vanadium-containing fuel oils in about the proportion hereinbefore specified. The additive has also been found to be effective in mitigating the deleterious effects attendant upon the combustion of sulphur-containing fuels.

WHAT WE CLAIM IS:—

1. A composition suitable for use as a fuel oil additive comprising (i) a tar acid fraction boiling within the range 180-320°C and (ii) a solid corrosion inhibitor (as hereinbefore defined).

2. A composition according to claim 1, in which the tar acid fraction has a boiling range of 230-280°C.

3. A composition according to claim 1, in which the tar acid fraction has a boiling range of 240-318°C.

4. A composition according to any one of the preceding claims, in which the tar acid fraction is a product of the low temperature carbonisation of coal.

5. A composition according to claim 1, in which the tar acid fraction has substantially the composition of the XL fraction hereinbefore specified.

6. A composition according to any one of the preceding claims, in which the solid corrosion inhibitor is or comprises an inorganic compound of an alkaline earth metal, magnesium, zinc or aluminium.

7. A composition according to any one of the preceding claims, in which the solid corrosion inhibitor is or comprises magnesia.

8. A composition according to any one of the preceding claims, in which the solid corrosion inhibitor forms 10-55% by weight of the composition.

9. A composition according to claim 8,

in which the solid corrosion inhibitor forms 15-35% by weight of the composition.

10. A composition according to any one of the preceding claims, including a minor proportion of a surfactant.

11. A composition according to claim 10, in which the surfactant is a fatty acid containing 12-22 carbon atoms in the molecule.

12. A composition useful as a fuel oil additive substantially as hereinbefore described with reference to any one of the Examples.

13. A method of treating a fuel oil which gives, upon combustion, a corrosive ash, which comprises adding to the fuel oil before or during combustion the composition claimed in any one of the preceding claims.

14. A method according to claim 13, in which the composition is metered into the fuel oil immediately before the oil is burnt.

15. A method for the production of the composition claimed in any one of claims 1 to 12, in which the solid corrosion inhibitor in finely divided form is dispersed in the tar acid fraction.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1973.
Published at the Patent Office, 25 Southampton Buildings, London WC2A 1AY, from which copies may be obtained.